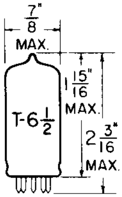
TUNG-SOL

TWIN TRIODE

MINIATURE TYPE

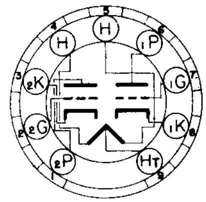


GLASS BULB

COATED UNIPOTENTIAL CATHODE

HEATER
6.3 VOLTS 0.35 AMP.
12.6 VOLTS 0.175 AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
9 PIN BASE
9A

THE 5814WA IS A RUGGEDIZED, MEDIUM MU, TWIN TRIODE OF THE NINE PIN MINIATURE CONSTRUCTION. THE TWO TRIODE SECTIONS ARE ELECTRICALLY INDEPENDENT, ALLOWING SIMULTANEOUS USE OF THE TWO IN COMPLETELY DIFFERENT APPLICATIONS. THE HEATER CENTER TAP PERMITS OPERATION FROM EITHER A 6.3 OR 12.6 VOLT SUPPLY. THE TUBE MAY BE ADAPTED TO SUCH APPLICATIONS AS VOLTAGE AMPLIFIER, OSCILLATOR-MIXER COMBINATION, MULTIVIBRATOR, OR PHASE INVERTER. CONTROLS ON THE PRODUCT AVERAGE FOR SUCH CHARACTERISTICS AS PLATE CURRENT, TRANSCONDUCTANCE, AND AMPLIFICATION FACTOR ASSURE THAT THESE CRITICAL CHARACTERISTICS WILL REMAIN WELL CENTERED. SINCE IT MUST BE ABLE TO WITHSTAND SEVERE MECHANICAL TESTS TO MEET TEST SPECIFICATIONS, THE 5814WA IS ESPECIALLY SUITED FOR USE IN MILITARY OR INDUSTRIAL AIRBORNE EQUIPMENT WHICH MAY BE SUBJECTED TO SEVERE SHOCK AND VIBRATION.

DIRECT INTERELECTRODE CAPACITANCES

	WITHOUT SHIELD SECT. #1	SECT. #2	
GRID TO PLATE (RATED)	1.5	1.5	μμf
INPUT (RATED)	1.6	1.6	μμf
OUTPUT (RATED)	0.50	0.35	μμf

RATINGS

ABSOLUTE MAXIMUM VALUES

HEATER VOLTAGE	6.3±10%	12.6±10%	VOLTS
MAXIMUM DC PLATE VOLTAGE	330		VOLTS
MAXIMUM PLATE DISSIPATION (EACH SECTION)	3.0		WATTS
MAXIMUM DC HEATER-CATHODE VOLTAGE	±200		VOLTS
MAXIMUM DC CATHODE CURRENT[A]	22		mA
MAXIMUM BULB TEMPERATURE	+165		°C

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A_1 AMPLIFIER - EACH TRIODE SECTION

HEATER VOLTAGE	6.3	12.6	6.3	12.6	VOLTS
HEATER CURRENT	0.35	0.175	0.35	0.175	AMP.
PLATE VOLTAGE	100		250		VOLTS
GRID VOLTAGE [B]	0		-8.5		VOLTS
AMPLIFICATION FACTOR	19.5		17		
PLATE RESISTANCE	6250		7700		OHMS
TRANSCONDUCTANCE	3100		2200		μMHOS
PLATE CURRENT	11.8		10.5		mA

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CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

E_f = 12.6V, E_b = 250Vdc, E_c = -8.5Vdc
(EXCEPT AS MODIFIED BELOW)

	INITIAL				500 HOUR LIFE TEST		
	INDIVIDUAL MIN.	INDIVIDUAL MAX.	PROD. MIN.	AVG. MAX.	INDIVIDUAL MIN.	INDIVIDUAL MAX.	
HEATER CURRENT	160	190	---	---	160	190	mA
HEATER–CATHODE LEAKAGE[C] (E_{hk} = ±100Vdc)	---	±10	---	---	---	±10	µAdc
GRID CURRENT (1) (R_g = 0.5 MEG.)	0	-0.5	---	---	0	-0.5	µAdc
PLATE CURRENT (1)	6.5	14.5	9.0	12.0	---	---	mAdc
TRANSCONDUCTANCE (1)	1750	2650	2000	2400	1600	2650	µMHOS
Δ AVG. TRANSCONDUCTANCE (1)	---	---	---	---	---	15	PERCENT
INSULATION OF ELECTRODES[D] (E_f=12.6V, E(g-all)=100Vdc, g NEG., E(p-all)=300Vdc, p NEG) R (g-all)	500	---	---	---	250	---	MEGOHM
R (p-all)	500	---	---	---	250	---	MEGOHM
PLATE CURRENT (2) (E_c=-25Vdc)	---	20	---	---	---	---	µAdc
Δ TRANSCONDUCTANCE (2)[S]	---	15	---	---	---	15	PERCENT
GRID CURRENT (2)[E] (E_f=14V)	0	-1.5	---	---	---	---	µAdc
PLATE CURRENT (1) DIFFERENCE BETWEEN SECTIONS	---	3.5	---	---	---	---	mAdc
TRANSCONDUCTANCE (3) (E_b=100Vdc, E_c=0)	2500	3700	2775	3425	---	---	µMHOS
AMPLIFICATION FACTOR	15.5	18.5	16.2	17.8	---	---	

SPECIAL REQUIREMENTS

	MIN.	MAX.	
VARIABLE FREQUENCY VIBRATION[CF] (R_p = 2000)	---	100	mVac
VIBRATIONAL FATIGUE[G]	---	---	
SHOCK[H] (HAMMER ANGLE=30°, E_{hk}=100Vdc, HEATER POSITIVE, R_g = 0.1 MEG.)	---	---	
POST SHOCK AND VIBRATIONAL FATIGUE TEST END POINTS			
LOW FREQUENCY VIBRATION	---	150	mVac
HEATER CATHODE LEAKAGE	---	±30	µAdc
TRANSCONDUCTANCE (3)	2000	---	µMHOS
GRID CURRENT (1)	---	1.5	µAdc
CONTINUITY AND SHORT[J]			
GLASS STRAIN[K]			
RF NOISE[LC] (E_c = -9Vdc, E_{cal} = 7.0mVac)	---	3.0	mW
NOISE AND MICROPHONICS[MCNP] (E_f=12.6Vac, E_{hk} = 0, E_{bb} = 300Vdc, Ec = 0, R_p = 50,000)	---	50	mVac
LOW FREQUENCY VIBRATION[QC] (R_p = 2000)	---	100	mVac
LOW PRESSURE VOLTAGE BREAKDOWN[K] (PRESSURE=55±5 mm MERCURY, TEMP.=25±5°C, HUMIDITY=0, VOLTAGE = 500Vac, 60 CYCLES SINUSOIDAL WAVEFORM)	500	---	Vac
1 HOUR STABILITY LIFE TEST (INTERMITTENT LIFE TEST CONDITIONS)	---	---	
STABILITY LIFE TEST END POINTS Δ TRANSCONDUCTANCE (1)	---	10	PERCENT
100 HOUR SURVIVAL RATE LIFE TEST (INTERMITTENT LIFE TEST CONDITIONS OR EQUIVALENT)	---	---	

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SPECIAL REQUIREMENTS - CONT'D.

	MIN.	MAX.	
HEATER CYCLING LIFE TEST (E_f = 7.5V, E_{hk} = 135 Vdc, HEATER POSITIVE, E_c = E_b = O)	---	---	
HEATER CYCLING LIFE TEST END POINTS HEATER—CATHODE LEAKAGE	---	±20	μAdc
INTERMITTENT LIFE TEST (Ehk = 135 Vdc, HEATER POS., R_g=0.5 MEG, MIN. BULB TEMP = +165°C)	---	---	

NOTES

[A] DIFFICULTY MAY BE ENCOUNTERED IF THIS TUBE IS OPERATED FOR LONG PERIODS OF TIME WITH VERY SMALL VALUES OF CATHODE CURRENT.

[B] THE DC RESISTANCE IN THE GRID CIRCUIT UNDER RATED MAXIMUM CONDITIONS SHOULD NOT EXCEED 0.25.

[C] TIE 1_p TO 2_p, 1_g TO 2_g, 1_k TO 2_k. (PARASITIC SUPPRESSORS OF 50 OHMS MAXIMUM PERMITTED.

[D] SEE MIL-E-1C 4.8.2

[E] PRIOR TO THIS TEST TUBES TO BE PREHEATED 5 MINUTES AT CONDITIONS INDICATED BELOW. TEST IMMEDIATELY AFTER PREHEATING. E_f=14.0V, E_{c1}=-8.5V, R_k=0 OHM, E_b=250 Vdc, R_g=0.5 MEG.

[F] SEE MIL-E-1C 4.9.20.3

[G] SEE MIL-E-1C 4.9.20.6

[H] SEE MIL-E-1C 4.9.20.5

[J] SEE MIL-E-1C 4.7 5

[K] GLASS STRAIN TEST CONSISTS OF COMPLETELY SUBMERGING THE TUBE INTO BOILING WATER (97°C-100°C) FOR A PERIOD OF 15 SECONDS, THEN IMMEDIATELY PLUNGING INTO COLD WATER (0°C ±3°C). THE AMOUNT OF WATER SHALL BE AT LEAST (2) LITERS PER 15 TUBES. TUBES FOR THIS TEST SHALL HAVE BEEN EXHAUSTED A MINIMUM OF 48 HOURS PRIOR TO PERFORMANCE OF THIS TEST. REJECT FOR EVIDENCE OF AIR LEAK.

[L] SEE MIL-E-1C 4.10.3.1

[M] SEE MIL-E-1C 4.10.3.5

[N] THE CATHODE RESISTOR SHALL BE SHUNTED WITH A CAPACITIVE REACTANCE NOT EXCEEDING 3 OHM @ 60 CYCLES.

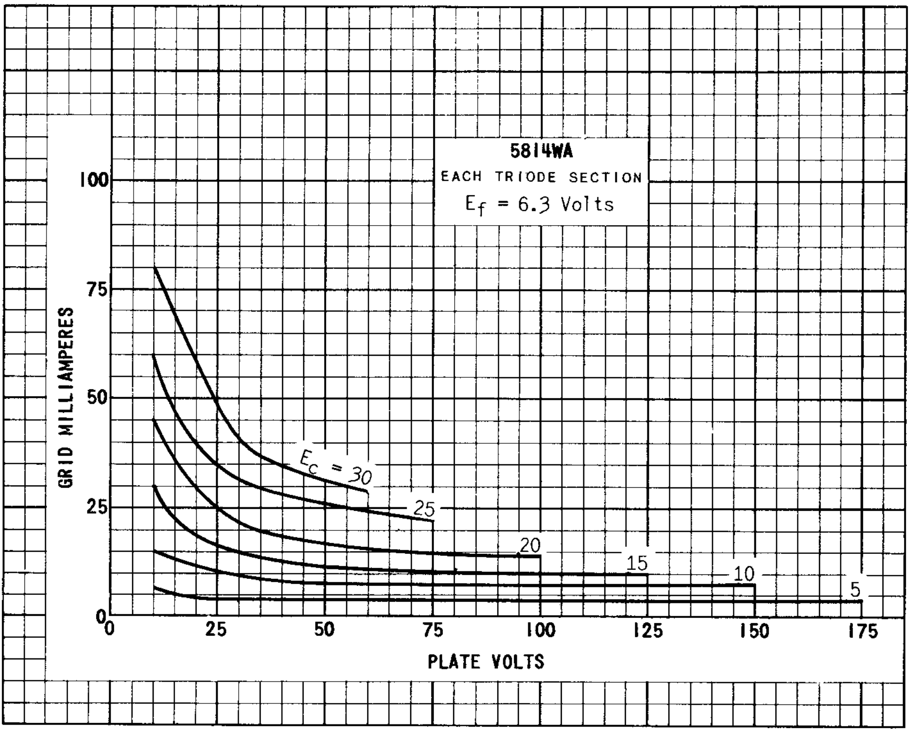
[P] TIE CATHODES TOGETHER AND GROUND THRU A 1500 OHM RESISTOR. GRIDS ARE GROUNDED.

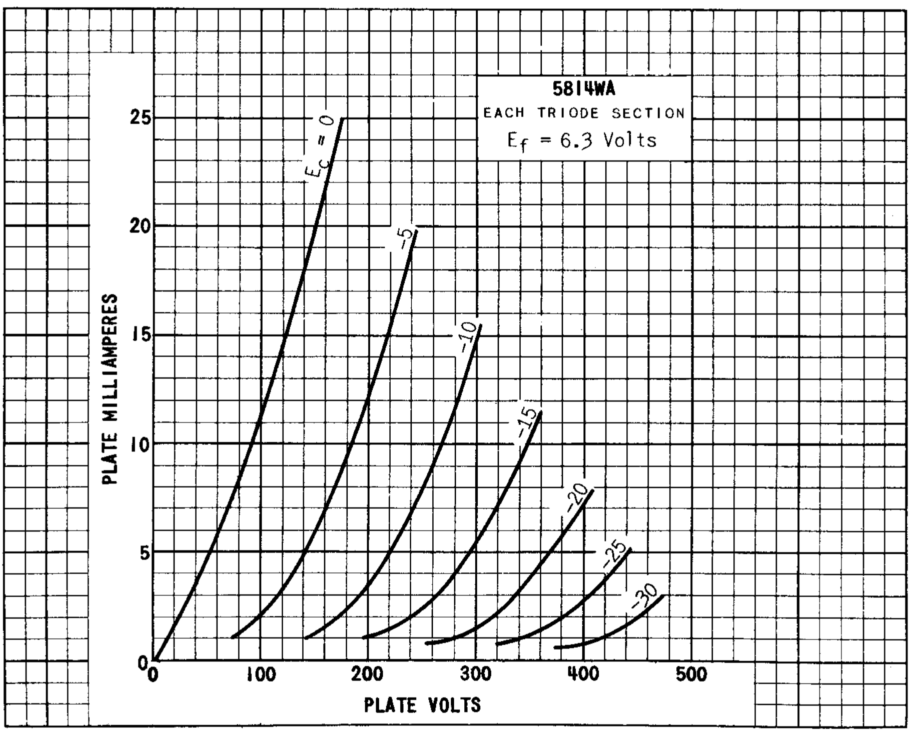
[Q] SEE MIL-E-1C 4.9.20.4

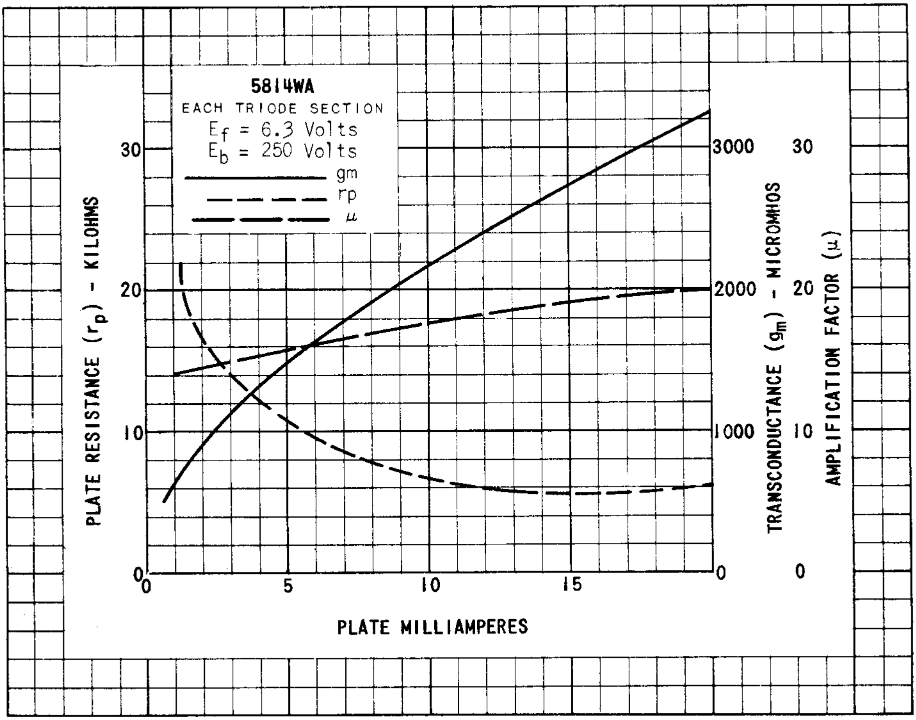
[R] BREAKDOWN SHALL BE DEFINED AS THE VOLTAGE AT WHICH ARCING OCCURS BETWEEN ANODE BASE PIN AND ADJACENT PINS.

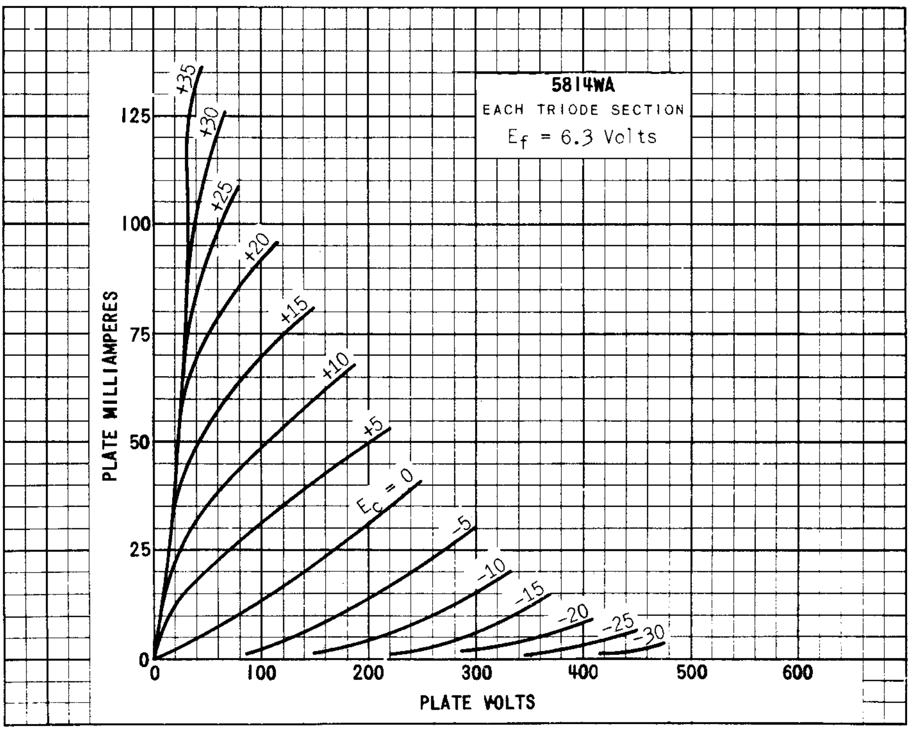
[S] THE VALUE OF TRANSCONDUCTANCE (2) SHALL APPLY TO INDIVIDUAL TUBES AND IS EXPRESSED:

$$\frac{(\text{SM AT } 12.6) - (\text{SM AT } 11.4)}{(\text{SM AT } 12.6)} \times 100$$


5814WA
EACH TRIODE SECTION
Ef = 6.3 Volts
GRID MILLIAMPERES
100
75
50
25
0
0
25
50
75
100
125
150
175
PLATE VOLTS
Ec = 30
25
20
15
10
5


5814WA
EACH TRIODE SECTION
Ef = 6.3 Volts
PLATE MILLIAMPERES
25
20
15
10
5
0
0
100
200
300
400
500
PLATE VOLTS
Ec = 0
-5
-10
-15
-20
-25
-30


5814WA
EACH TRIODE SECTION
E_f = 6.3 Volts
E_b = 250 Volts
gm
rp
μ
PLATE RESISTANCE (r_p) - KILOHMS
TRANSCONDUCTANCE (g_m) - MICROMHOS
AMPLIFICATION FACTOR (μ)
PLATE MILLIAMPERES
0
5
10
15
10
20
30
1000
2000
3000


5814WA
EACH TRIODE SECTION
E_f = 6.3 Volts
PLATE MILLIAMPERES
PLATE VOLTS
+35
+30
+25
+20
+15
+10
+5
E_c = 0
-5
-10
-15
-20
-25
-30
0
25
50
75
100
125
100
200
300
400
500
600